BS EN 845-2:2013+A1:2016

Incorporating corrigendum September 2013

BSI Standards Publication

Specification for ancillary components for masonry

Part 2: Lintels

bsi.

National foreword

This British Standard is the UK implementation of EN 845-2:2013+A1:2016. It supersedes BS EN 845-2:2013 which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by [A1] ⟨A1⟩.

EN 845-2 specifies the characteristics and performance requirements for lintels available throughout the CEN member countries. It aims to do so in product performance terms, avoiding as far as possible prescriptive requirements and all the traditional designations of lintels available throughout Europe.

EN 845-2 includes clauses covering initial type tests, factory production control, sampling for initial type testing and independent testing of consignments. These are similar in all masonry product specifications.

The UK National Annex NA attached to this standard provides an informative commentary on EN 845-2. Nothing in this annex should be construed as specifying requirements other than those contained in the normative parts of this European Standard.

If CE marking is performed, the procedures in Annex ZA will apply. The significance of the CE marking is that the product manufacturer claims compliance with the "harmonized" requirements given in the normative text of the product standard. These relate to the basic requirements for construction works as given in the Construction Products Regulation. Not all product characteristics need necessarily be given on the CE marking, but those product characteristics covered by regulations in force in each EU Member State, where the manufacturer intends that the product will be used, do need to be stated.

The UK participation in its preparation was entrusted by Technical Committee B/519, Masonry and associated testing, to Subcommittee B/519/3, Ancillary components.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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Date	Text affected
30 September 2013	Correction to supersession details
30 September 2016	Implementation of CEN amendment A1:2016. National foreword and National Annex NA updated

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EUROPÄISCHE NORM

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English Version

Specification for ancillary components for masonry - Part 2: Lintels

Spécifications pour composants accessoires de maçonnerie - Partie 2: Linteaux

Festlegungen für Ergänzungsbauteile für Mauerwerk - Teil 2: Stürze

This European Standard was approved by CEN on 21 March 2013 and includes Amendment 1 approved by CEN on 9 April 2016.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 845-2:2013+A1:2016) has been prepared by Technical Committee CEN/TC 125 “Masonry”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2017, and conflicting national standards shall be withdrawn at the latest by April 2018.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document includes Amendment 1 approved by CEN on 2016-04-09.

This document supersedes A1 EN 845-2:2013 A1.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

A1 *deleted text* A1

EN 845, *Specification for ancillary components for masonry*, consists of the following parts:

— *Part 1: Wall ties, tension straps, hangers and brackets*

— *Part 2: Lintels*

— *Part 3: Bed joint reinforcement of steel meshwork*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard specifies requirements for prefabricated lintels for maximum spans of 4,5 m and made from steel, autoclaved aerated concrete, manufactured stone, concrete, fired clay units, calcium silicate units, natural stone units, or a combination of these materials. Concrete and steel beams conforming to EN 1090-1, EN 12602 and EN 13225, as appropriate, are not covered by this standard.

Prefabricated lintels can be either complete lintels or the prefabricated part of a composite lintel.

This European Standard is not applicable to:

a) lintels completely made on site;

b) lintels of which the tensile parts are made on site;

c) timber lintels;

d) natural stone lintels, not reinforced.

Linear components spanning clear openings greater than 4,5 m in masonry walls and linear components intended for use independently in a structural role (e.g. beams) are not covered by this standard.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 206-1:2000, *Concrete — Part 1: Specification, performance, production and conformity*

EN 771 (all parts), *Specification for masonry units*

EN 772-1, *Methods of test for masonry units — Part 1: Determination of compressive strength*

EN 772-11, *Methods of test for masonry units — Part 11: Determination of water absorption of aggregate concrete, autoclaved aerated concrete, manufactured stone and natural stone masonry units due to capillary action and the initial rate of water absorption of clay masonry units*

EN 846-9, *Methods of test for ancillary components for masonry — Part 9: Determination of flexural resistance and shear resistance of lintels*

EN 846-11, *Methods of test for ancillary components for masonry — Part 11: Determination of dimensions and bow of lintels*

EN 846-13:2001, *Methods of test for ancillary components for masonry — Part 13: Determination of resistance to impact, abrasion and corrosion of organic coatings*

EN 846-14, *Methods of test for ancillary components for masonry — Part 14: Determination of the initial shear strength between the prefabricated part of a composite lintel and the masonry above it*

EN 990, *Test methods for verification of corrosion protection of reinforcement in autoclaved aerated concrete and lightweight aggregate concrete with open structure*

EN 998-2:2010, *Specification for mortar for masonry — Part 2: Masonry mortar*

EN 1745, *Masonry and masonry products — Methods for determining thermal properties*

EN 10080, *Steel for the reinforcement of concrete — Weldable reinforcing steel — General*

EN 10088 (all parts), *Stainless steels*

prEN 10138 (all parts), *Prestressing steels*

EN 10346:2009, *Continuously hot-dip coated steel flat products — Technical delivery conditions*

EN 12602:2008, *Prefabricated reinforced components of autoclaved aerated concrete*

EN 13501-2, *Fire classification of construction products and building elements — Part 2: Classification using data from fire resistance tests, excluding ventilation services*

EN ISO 1461, *Hot dip galvanized coatings on fabricated iron and steel articles — Specifications and test methods (ISO 1461)*

EN ISO 1463, *Metallic and oxide coatings — Measurement of coating thickness — Microscopical method (ISO 1463)*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

NOTE 1 Examples of lintel types are shown in Figures 1 to 3. The figures are only for illustration of lintel types. Other details such as bearings, thermal insulation systems and damp proof courses are not shown.

NOTE 2 General dimensions defined in Clause 3 are illustrated in Figures 3 and 4.

3.1.1
autoclaved aerated concrete lintel
lintel manufactured using reinforced autoclaved aerated concrete

3.1.2
bearing length
length of the end of a lintel which bears on its support

3.1.3
built-in length
minimum length needed to anchor the reinforcing bars

3.1.4
clear opening
clear distance between lintel supports

3.1.5
combined lintel
lintel consisting of two or more structural elements each one acting with compression and tension zones

3.1.6
composite lintel
lintel comprising a prefabricated part and a complementary element of in-situ masonry or concrete above, acting together

3.1.7
composite lintel height
overall height of the tension and compression zones of a composite lintel

3.1.8
concrete lintel
lintel manufactured using reinforced or prestressed concrete

3.1.9
declared value
value for a product property, determined in accordance with this standard, that a manufacturer is confident of achieving, bearing in mind the variability of the manufacturing process

3.1.10
effective span
distance between the centres of the bearing of a lintel, or the clear opening spanned by the lintel plus the overall height of the lintel including any complementary element, whichever is the lesser

3.1.11
flexural resistance
mean uniformly distributed load at which failure of a sample of lintel specimens occurs (or a lower load at which tests are stopped in accordance with the recommendations of the manufacturer of the lintel)

3.1.12
lintel
lineal element supporting load over an opening in a masonry wall

3.1.13
lintel height
overall height of the prefabricated part of a lintel

3.1.14
lintel length
overall length of the prefabricated lintel

3.1.15
load bearing capacity
mean value for a sample of lintels of the total of the uniformly distributed load at failure or at an extreme deflection, whichever is the lesser

3.1.16
load ratio
ratio of inner leaf load to outer leaf load on a lintel supporting a double-leaf or cavity wall

3.1.17
masonry lintel
lintel comprising one or more shell casing units completed by the incorporation within the shell casing of reinforced or prestressed concrete

3.1.18
shear resistance
mean shear load at which failure of a sample of lintel specimens occurs (or a lower load at which tests are stopped in accordance with the recommendations of the manufacturer of the lintel)

3.1.19
shell casing unit
preformed component with one or more channels into which is incorporated either reinforced or prestressed concrete

3.1.20
single lintel
prefabricated lintel acting alone

3.1.21
declared deflection
deflection at one third of the declared load capacity of the lintel

3.1.22
steel lintel
lintel manufactured from steel

3.1.23
structural shell casing unit
shell casing unit which is made of a material with a compressive strength not less than that of the infill concrete

3.2 Symbols

NOTE General dimensions are illustrated in Figures 3 and 4.

b_s is the smallest width of a structural shell casing unit specimen, in mm (see Figure 5);

b is the bearing length, in mm;

d_{ppcl} is the height of the prefabricated part of the composite lintel;

d_C is the composite lintel height, in mm;

d_l is the lintel height, in mm;

δ_{dv} is the declared deflection in a vertical direction, in mm;

δ_{dh} is the declared deflection in a horizontal direction, in mm;

h_u is the height of the masonry unit;

t_{bj} is the thickness of the bedjoint;

h_s is the cut length of a structural shell casing unit specimen, in mm (see Figure 5);

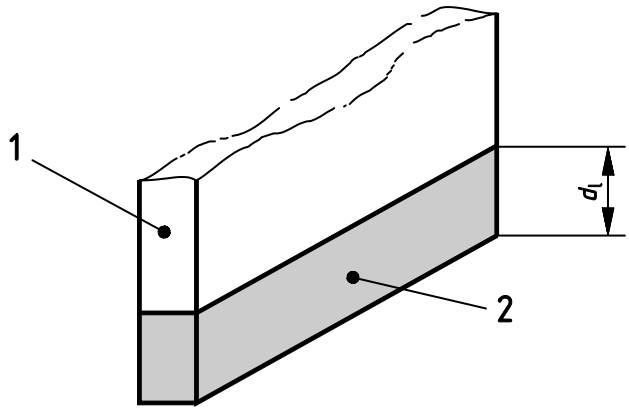
l is the lintel length, in mm;

l_0 is the clear opening, in mm;

l_e is the effective length, in mm;

F_{tkl} is the tensile resistance of the prefabricated part in the ultimate limit state;

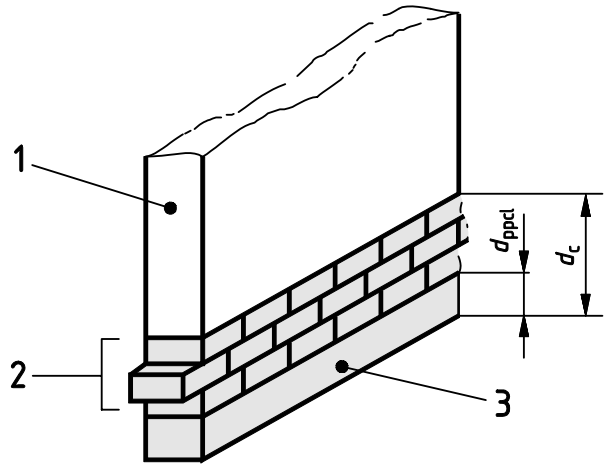
f_{vk0i} is the initial shear strength between the prefabricated part of the lintel and the mortar in the bed joint above.



Key

1 supported masonry
2 single lintel

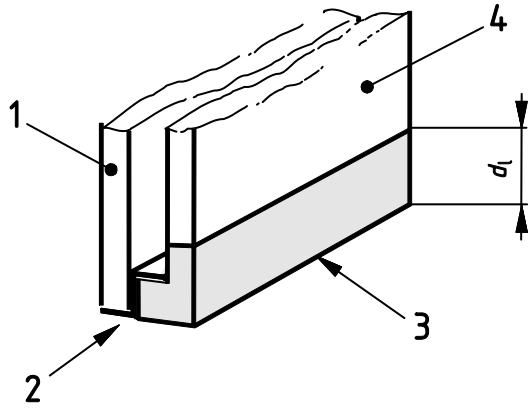
Figure 1 — Example of a single lintel (see 3.1.20)



Key

1 supported masonry
2 complementary element (masonry or concrete)
3 prefabricated part

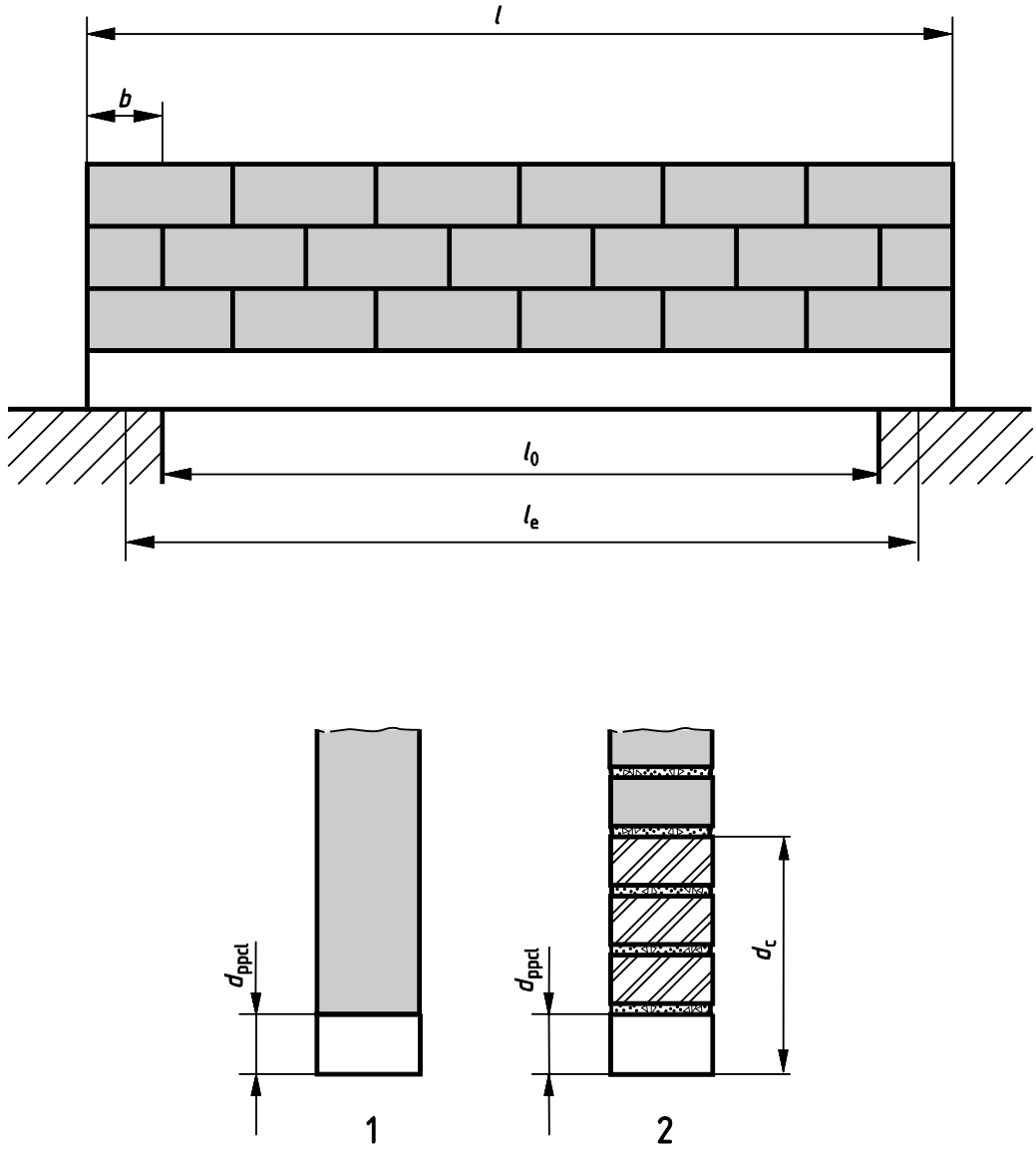
Figure 2 — Example of a composite lintel (see 3.1.6)



Key

1	supported masonry - outer leaf	3	inner leaf lintel
2	outer leaf lintel	4	supported masonry – inner leaf

Figure 3 — Example of a combined lintel (see 3.1.5)



Key

1 lintels other than composite lintels
2 composite lintel

Figure 4 — General dimensions

4 Materials

4.1 Steel lintels

Materials for the manufacture of steel lintels covered by this standard shall be selected from Annex C.1 and the material/coating reference shall be declared.

4.2 Concrete lintels

Concrete lintels shall be fabricated from reinforced or prestressed concrete with or without non-structural shell casing units.

Steel for the reinforcement of concrete shall conform to EN 10080.

Stainless steel for reinforcement shall conform to EN 10088-5.

Prestressing steels shall conform to prEN 10138 (all parts).

For lintels covered by this standard, wire diameters shall be 2,5 mm or greater.

The concrete shall conform with the material requirements clauses of EN 206-1.

Autoclaved aerated concrete shall conform to EN 12602 (definition and material requirement clauses only).

4.3 Masonry lintels

Masonry lintels shall be fabricated using reinforced or prestressed concrete, masonry mortar, and structural or non-structural shell casing masonry units as follows:

a) concrete and steel in accordance with 4.2;

b) masonry mortar in accordance with EN 998-2;

c) shell casing units shall be made from:

   1) clay in accordance with the material requirement clauses of EN 771-1;

   2) calcium silicate in accordance with the material requirement clauses of EN 771-2;

   3) aggregate concrete in accordance with the material requirement clauses of EN 771-3;

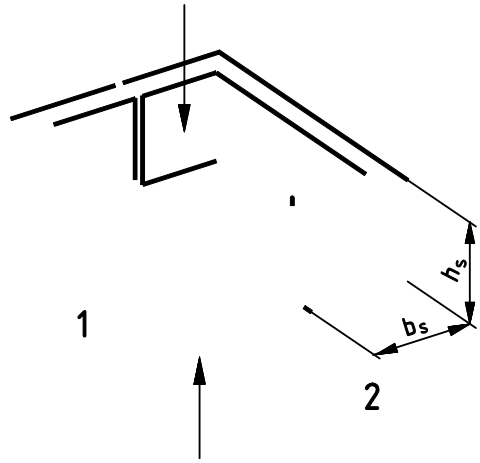
   4) autoclaved aerated concrete in accordance with the material requirement clauses of EN 771-4;

   5) manufactured stone in accordance with the material requirement clauses of EN 771-5;

   6) natural stone in accordance with the material requirement clauses of EN 771-6.

   NOTE All shell casing units can contribute to the mechanical performance of the lintel. However, where their contribution is verified by calculation methods or the shell casing units are taken into account in providing cover to the reinforcement, they are deemed to be structural shell casing units.

The compressive strength of structural shell casing units shall be determined in accordance with the principles of EN 772-1 using a cut specimen. Specimen set up and dimensional relationships are given in Figure 5.



Key

1 two specimens tested together to achieve symmetrical loading

2 cut length h_s equals smallest width b_s

Figure 5 — Specimens for compressive strength test on structural shell casing units

Corresponding mortar joints shall be selected to meet the design performance requirements of the lintel.

4.4 Combined and composite lintels

If the declaration or additional information for composite lintels includes an assumption about materials or components needed, but not supplied by the lintel manufacturer, to complete the lintel, then the required properties shall be specified in accordance with this or other relevant European Standards or European Technical Approvals.

5 Requirements

5.1 General

The requirements and properties specified in this standard shall be defined in terms of the test methods and procedures referred to in this European Standard.

NOTE 1 Guidance on the use and installation of lintels is given in informative Annexes A and B.

NOTE 2 The conformity criteria given in 5.2 to 5.11 inclusive relate to initial type tests (see 8.2) and, where relevant, consignment testing [A1] *deleted text* [A1].

For production evaluation, conformity criteria in the factory production control documentation shall be defined.

5.2 Dimensions, mass and limit deviations

5.2.1 Dimensions

The length, width and height of the lintel shall be declared and, in the case of non-rectangular shapes or cross sections, a drawing of the configuration with dimensions shall be given.

5.2.2 Mass per unit area

The mass and the mass per unit area on elevation of the lintel shall be declared. The mass shall be determined from specimens sampled in accordance with Clause 8 using instruments capable of measuring and weighing the specimen to an error limit of 0,1 % of each reading. The mean mass of the specimens shall be divided by the product of the mean overall length and the mean overall height to give the mass per unit area on elevation. The deviation from the declared value of mass shall not exceed 5 %.

5.2.3 Built-in length

The minimum built-in length, which shall be not less than 100 mm, shall be declared.

5.2.4 Deviation from declared values

When sampled in accordance with Clause 8 and measured by the method of EN 846-11, the deviations from the declared values for dimensions and intended shapes or cross-sections shall not exceed those given in Table 1.

Table 1 — Dimensional deviations

Dimension	Limit deviation
Length	± 15 mm
Width and height	± 5 mm
Straightness or bow (horizontal and vertical curvature)	0,5 % of the length, subject to a maximum value of 10 mm from the intended profile
Camber of prefabricated part of the composite lintel	0,7 % of the length from the intended profile

5.3 Mechanical performance and information to obtain the mechanical performance

5.3.1 Single lintels, combined lintels and composite lintels

5.3.1.1 General

The load bearing capacity shall be declared from the results of tests, using test methods specified in this standard, or from their interpretation.

When calculation models are used to interpret and extend the results obtained from testing they should be based on a mechanical approach and appropriate material properties. Historic test data may be used to demonstrate the validity of the calculation model.

The ultimate demonstration of compliance with this standard shall be by testing, in accordance with the methods in EN 846-9, on samples selected in accordance with Clause 8.

5.3.1.2 Load bearing capacity and load ratio

The requirements for flexural resistance in accordance with 5.3.1.3 and shear load resistance in accordance with 5.3.1.5 shall be met in all cases.

NOTE The declared value of load bearing capacity is based on the lower of the flexural resistance (see 5.3.1.3) and twice the shear load resistance (see 5.3.1.5).

The load bearing capacity in kN/m of the lintel shall be declared as a mean value. When required, the characteristic value shall also be declared. Unless otherwise stated, these values shall be those corresponding to the applicable maximum clear opening taking into account the declared values of the minimum bearing length and the length of the lintel.

Where lintels are intended to support two or more leaves of masonry, any restrictions on the distribution of load across the width of the lintel in terms of the range of load ratios that can be used shall be declared.

5.3.1.3 Flexural resistance

When sampled in accordance with Clause 8 and tested by the method of EN 846-9, the flexural resistance shall be greater than or equal to the declared value of load bearing capacity in accordance with 5.3.1.2 and no individual value of flexural failure load shall be less than 90 % of the declared value of load bearing capacity.

When it is required to declare a characteristic value in addition to declaring the vertical load capacity according to EN 846-9 as a mean of the test results, the characteristic value should be taken as 0,9 of the mean value.

5.3.1.4 Short term deflection

The short term vertical deflection, $\delta_{dv,}$ and also the horizontal deflection, δ_{dh}, when relevant, at one third of the declared load bearing capacity shall be declared. When sampled in accordance with Clause 8 and tested in accordance with EN 846-9, for flexural resistance, the appropriate mean deflections of the sample, as relevant, measured at one third of the declared load bearing capacity shall be less than or equal to the declared deflections δ_{dv} and δ_{dh}.

It is only necessary to declare the horizontal deflection δ_{dh} if it is relevant.

If it is required to know the long-term deflection, then the short term one may be increased according to the loading regime, creep and shrinkage values given in the appropriate Eurocodes.

5.3.1.5 Shear resistance

When sampled in accordance with Clause 8 and tested by the method of EN 846-9, the shear resistance shall be greater than or equal to 50 % of the declared value of load bearing capacity evaluated in accordance with 5.3.1.2 and the shear failure load of any individual specimen shall be not less than 45 % of the declared value of load bearing capacity.

When required, the shear resistance shall be declared additionally as a characteristic value.

When it is required to declare a characteristic value in addition to declaring the vertical load capacity according to EN 846-9 as a mean of the test results, the characteristic value should be taken as 0,9 of the mean value.

5.3.2 Prefabricated part of composite lintels

If the load bearing capacity of a composite lintel is not declared by the manufacturer, the following parameters shall be declared for the prefabricated part:

— Geometry and configuration of the prefabricated part of the lintel including the position, diameter and yield strength of the reinforcement.

— Characteristic tensile resistance, F_{tkl}, of the prefabricated part of the lintel in the ultimate limit state. If relevant for durability, the tensile resistance shall also be given in the serviceability limit state.

— Characteristic initial shear strength f_{vk0i} between the prefabricated part of the lintel and the mortar in the bed joint above. The declaration may either be made on the basis of fixed values or tests. The declaration shall indicate whether the initial shear strength has been obtained from fixed values or from tests. When the declaration is based on fixed values the characteristic initial shear strength may be declared by using the appropriate value of characteristic initial shear strength given in Annex C of EN 998-2:2010. When the declared value is based on tests then the test shall follow the procedure given in EN 846-14 and the initial shear strength of specimens when sampled in accordance with Clause 8 and tested by the method given in EN 846-14 shall be greater than or equal to the declared value.

5.4 Durability

5.4.1 General

The materials for the manufacture of the lintels and their corrosion protection systems shall be selected in accordance with 5.4.2 or 5.4.3 and the material/coating reference in accordance with Annex C shall be declared.

NOTE The durability of performance characteristics against corrosion is dependent on both the condition of exposure of the masonry and the material/coating specification. This European Standard follows the state of the art by giving material/coating specifications to suit.

5.4.2 Steel lintels

Steel lintels, other than those made from ferritic stainless steel, austenitic stainless steel or austenitic ferritic stainless steel, shall be protected against corrosion in accordance with the requirements of C.1 in Annex C.

NOTE The corrosion protection required in any individual application will depend on the type of lintel, whether a separate damp proof system is used, the degree of exposure and the climatic conditions and therefore several grades of protection are given.

5.4.3 Concrete lintels and masonry lintels

The reinforcement of concrete and masonry lintels shall be protected against corrosion in accordance with the requirements of C.2 and C.3 in Annex C.

The joints between the structural shell casing units and any grooves they contain shall be filled with concrete or mortar. Where the joints are not filled, the units shall be considered to be non-structural.

5.5 Water penetration and installation

All necessary information on the correct procedure for installing the lintel to avoid the risk of water penetration shall be provided.

NOTE For installation, see Annex B.

5.6 Thermal properties

Details shall be provided of the thermal properties of the materials from which the lintel is made by reference to thermal conductivity values given in EN 1745, or, where not given in that standard, by reference to thermal conductivity values given in European Standards for the materials of construction.

5.7 Freeze/thaw resistance

5.7.1 General

When relevant to the uses for which the lintel is placed on the market and in all cases for lintels intended to be used in external elements, the freeze/thaw resistance of lintels shall be declared.

5.7.2 Steel lintels

Steel lintels may be classified as freeze/thaw resistant.

5.7.3 Concrete lintels

Lintels made with concrete conforming to EN 206-1 and meeting the requirements for exposure class XF1 of EN 206-1:2000 may be classified as 'freeze thaw/resistant'.

5.7.4 Masonry lintels

Masonry lintels may be classified as 'freeze/thaw resistant' where the following conditions are met:

a) the concrete part meets the requirements of 5.7.3 to be classified as freeze/thaw resistant; and

b) the masonry units in the lintel are freeze/thaw resistant according to the requirements of the relevant part of EN 771.

5.8 Resistance to fire

Where relevant to the uses for which the lintel type is placed on the market, the resistance to fire shall be classified on the basis of testing of a lintel, either as part of a wall with or without fire separating function or as a beam, in accordance with EN 13501-2. Alternatively, the classification may be based on tabulated values for the material type and form as given in the appropriate European Standards. Where classification is relevant, a lintel type may be classified for use in particular forms of construction, as verified from tabulated values or by the interpretation of test data.

All lintels can form part of a fire resisting construction when suitably protected. Where a lintel type is intended for use in more than one form of construction, tests may need to be performed on one or more test systems.

5.9 Water absorption

5.9.1 General

Where relevant to the uses for which the lintel is placed on the market and in all cases for concrete and masonry lintels to be used in exposed external elements, the water absorption coefficient due to capillary action or the initial rate of water absorption, as relevant, shall be declared.

5.9.2 Steel lintels

Steel lintels may be classified as having a water absorption coefficient of zero.

5.9.3 Other lintels

When lintels other than steel lintels are sampled in accordance with Clause 8 and tested by the method of EN 772-11, for immersion times as specified in the relevant part of EN 771, the initial rate of water absorption of clay masonry lintels and the coefficient of water absorption of other lintels shall be not greater than the declared values.

5.10 Water vapour permeability

When relevant to the uses for which a lintel, other than a steel lintel, is placed on the market, the water vapour diffusion coefficient (lower and upper values) in accordance with EN 1745 shall be declared.

NOTE This characteristic is not relevant for steel lintels.

5.11 Dangerous substances

National regulations on dangerous substances may require verification and declaration on release, and sometimes content, when construction products covered by this standard are placed on those markets.

In the absence of European harmonised test methods, verification and declaration on release/content should be done taking into account national provisions in the place of use.

NOTE An informative database covering European and national provisions on dangerous substances is available at the Construction web site on EUROPA accessed through: *http://ec.europa.eu/enterprise/construction/cpd-ds/*.

6 Description and designation

The information to be supplied shall be as given in Tables 2, 3 and 4.

Table 2 — Information to be provided for single lintel and combined lintel

Information reference number	Single lintel and combined lintel
1	Load bearing capacity, in kN/m
2	Failure mode where relevant
3	Deflection $\delta_{dv,}$ and δ_{dh} if relevant, at one-third of the load bearing capacity
4	Water absorption of masonry unit, concrete and mortar components
5	Water vapour permeability where relevant
6	Mass in kg and mass per unit area of the lintel, in kg/m^2
7	Freeze/thaw resistance where relevant
8	Material/coating specification in accordance with normative Annex C
9	Thermal performance
10	Resistance to fire where relevant
11	Lintel type
12	Minimum built-in length, in mm
13	Length, in mm
14	Width and height, in mm
15	Configuration
16	Whether concrete lintels and masonry lintels are required to be rendered
17	Whether a damp proof course is required
18	Where relevant, the component parts of a combined lintel that are not supplied as part of the product

Table 3 — Information to be provided for composite lintel, when the load bearing capacity is declared

Information reference number	Composite lintel
1	Load bearing capacity, in kN/m
2	Failure mode where relevant
3	Deflection $\delta_{dv,}$ and δ_{dh} where relevant, at one-third of the load bearing capacity
4	Water absorption of masonry unit, concrete and mortar components
5	Water vapour permeability where relevant
6	Mass per unit area on elevation of the prefabricated part only of the lintel, in kg/m^2
7	Freeze/thaw resistance where relevant
8	Material/coating specification in accordance with Annex C, steel grade and concrete strength class relevant to lintel
9	Thermal performance
10	Resistance to fire
11	Lintel type
12	Minimum built-in length, in mm
13	Length, in mm
14	Width and height of the prefabricated part, in mm
15	Configuration
16	Minimum width of the complementary element, in mm
17	Height of the complementary element, in mm
18	Whether concrete lintels and masonry lintels are required to be rendered
19	Whether a damp proof course is required
20	Types of masonry units that may be used
21	Specification of the materials in the complementary element including the minimum compressive strength of masonry units in the direction parallel to the span of the lintel, in N/mm^2
22	Minimum mortar strength, in N/mm^2
23	Minimum strength class of concrete
24	Instructions for propping the lintel during construction including the maximum spacing of props, in mm, and the load that can be applied during the installation of the lintel.

Table 4 — Information to be provided when only the properties of the prefabricated part of composite lintel are declared

Information reference number	Prefabricated part of composite lintel
1	Water absorption of masonry unit, concrete and mortar components
2	Water vapour permeability where relevant
3	Mass per unit area on elevation of the prefabricated part only of the lintel, in kg/m^2
4	Freeze/thaw resistance where relevant
5	Material/coating specification in accordance with normative Annex C, steel grade and concrete strength class relevant to lintel
6	Thermal performance
7	Resistance to fire
8	Lintel type
9	Minimum built-in length, in mm
10	Length, in mm
11	Width and height of the prefabricated part, in mm
12	Geometry and configuration of the prefabricated part including the position, diameter and yield strength of the reinforcement
13	Whether concrete lintels and masonry lintels are required to be rendered
14	Whether a damp proof course is required
15	Characteristic tensile resistance of the prefabricated part of the lintel. The tensile strength resistance in the serviceability limit state also if relevant.
16	Initial shear strength between the prefabricated part of the lintel and the mortar in the bed joint above. Fixed value or tested value.

7 Marking

The following information shall be clearly and indelibly marked on the lintel or on its packaging, delivery note, invoice or in the accompanying documentation, supplied with the product:

a) the number and date of issue of this European Standard, ⟦A1⟩ EN 845-2:2013+A1:2016 ⟦/A1⟧;

b) the name or identifying mark and registered address of the manufacturer, or the manufacturer's authorised representative;

c) a unique reference number, name or code which will identify the product type, and relate it to its description and designation and intended use.

In addition, the lintel shall be suitably marked to indicate its orientation in use and in the case of lintels intended to support more than one masonry leaf that portion of the lintel which is to carry the inner leaf and that which is to carry the outer.

A1

8 Assessment and verification of constancy of performance - AVCP

8.1 General

The compliance of lintels with the requirements of this standard and with the performances declared by the manufacturer in the DoP shall be demonstrated by:

— determination of the product type;

— factory production control by the manufacturer, including product assessment.

The manufacturer shall always retain the overall control and shall have the necessary means to take responsibility for the conformity of the product with its declared performance(s).

NOTE The assignment of tasks to the notified body(ies) and the manufacturer is shown in Table ZA.2.

8.2 Type testing

8.2.1 General

All performances related to characteristics included in this standard shall be determined when the manufacturer intends to declare the respective performances unless the standard gives provisions for declaring them without performing tests. (e.g. use of previously existing data, and conventionally accepted performance).

Assessment previously performed in accordance with the provisions of this standard, may be taken into account provided that they were made to the same or a more rigorous test method, under the same AVCP system on the same product or products of similar design, construction and functionality, such that the results are applicable to the product in question.

NOTE Same AVCP system means testing by an independent third party, under the responsibility of a notified product certification body

For the purposes of assessment, the manufacturer's products may be grouped into families, where it is considered that the results for one or more characteristics from any one product within the family are representative for that same characteristics for all products within that same family

In addition, the determination of the product type shall be performed for all characteristics included in the standard for which the manufacturer declares the performance:

— at the beginning of the production of a new or modified lintel (unless a member of the same product range), or

— at the beginning of a new or modified method of production (where this may affect the stated properties); or

— they shall be repeated for the appropriate characteristic(s), whenever a change occurs in the lintel design, in the raw material or in the supplier of the components, or in the method of production (subject to the definition of a family), which would affect significantly one or more of the characteristics.

Where components are used whose characteristics have already been determined, by the component manufacturer, on the basis of assessment methods of other product standards, these

characteristics need not be re-assessed. The specifications of these components shall be documented.

Products bearing regulatory marking in accordance with appropriate harmonized European specifications may be presumed to have the performances declared in the DoP, although this does not replace the responsibility on the lintel manufacturer to ensure that lintel as a whole is correctly manufactured and its component products have the declared performance values.

8.2.2 Test samples, testing and compliance criteria

The minimum sample size of a lintel for a single test shall be as given in Table 2 and shall be drawn at random. For initial type testing, the batch from which the sample is drawn shall be of a size of at least 100 times the number of specimens taken. Pre-production samples may be used for initial type tests where it is possible to demonstrate that the characteristics of performance are representative of products from the full production process.

Table 5 — Sampling numbers of specimens for lintels

Type test		**Minimum number of samples per test**
Clause	**Characteristic**	
4.3 and Table C.3	Strength of shell casing units (EN 772-1)	6
5.2	Dimensions and mass	6
5.3.1.3 and 5.3.1.4	Flexural resistance and deflection	3
5.3.1.5	Shear load resistance	3
5.3.2	Initial shear strength	3
5.4 and Table C.2	Durability of organic coatings (EN 846-13)	See EN 846-13
5.6	Thermal performance	See EN 1745
5.7	Freeze/thaw resistance	See EN 771 (all parts) or EN 998-2
5.8	Resistance to fire	1
5.9	Water absorption	3 shell casing units or lintels [a]
[a] For lintels or shell casing units with exposed face dimensions greater than 500 mm × 300 mm samples shall be cut from separate lintels or shell casing units such that the exposed face is a square or rectangle with least dimension not less than 100 mm.		

In the event of the need to check the compliance of a lot or consignment of a product supplied to site or installed, a sample shall be taken at random from the lot or consignment and tested. The sample sizes shall be not less than those given in Table 2.

8.2.3 Test reports

The results of the determination of the product type shall be documented in test reports. All test reports shall be retained by the manufacturer for at least 10 years after the last date of production of the lintel to which they relate.

8.2.4 Shared other party results

NOTE The sharing of other party results is in principle applicable to all systems of assessment and evaluation of constancy of performance.

A manufacturer may use the results of the product type determination obtained by someone else (e.g. by another manufacturer, as a common service to manufacturers, or by a product developer), to justify his own declaration of performance regarding a product that is manufactured according to the same design (e.g. dimensions) and with raw materials, constituents and manufacturing methods of the same kind, provided that:

— the results are known to be valid for products with the same essential characteristics relevant for the product performance;

— in addition to any information essential for confirming that the product has such same performances related to specific essential characteristics, the other party who has carried out the determination of the product type concerned or has had it carried out, has expressly accepted to transmit to the manufacturer the results and the test report to be used for the latter's product type determination, as well as information regarding production facilities and the production control process that can be taken into account for FPC;

— the manufacturer using other party results accepts to remain responsible for the product having the declared performances and he also:

— ensures that the product has the same characteristics relevant for performance as the one that has been subjected to the determination of the product type, and that there are no significant differences with regard to production facilities and the production control process compared to that used for the product that was subjected to the determination of the product type; and

— keeps available a copy of the determination of the product type report that also contains the information needed for verifying that the product is manufactured according to the same design and with raw materials, constituents and manufacturing methods of the same kind.

8.3 Factory production control (FPC)

8.3.1 General

The manufacturer shall establish, document and maintain an FPC system to ensure that the products placed on the market comply with the declared performance of the essential characteristics.

The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control raw and other incoming materials or components, equipment, the production process and the product.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures.

This factory production control system documentation shall ensure a common understanding of the evaluation of the constancy of performance and enable the achievement of the required product performances and the effective operation of the production control system to be checked. Factory production control therefore brings together operational techniques and all measures allowing maintenance and control of the compliance of the product with the declared performances of the essential characteristics.

In case the manufacturer has used shared product type results, the FPC shall also include the appropriate documentation as foreseen in 8.2.4.

8.3.2 Requirements

8.3.2.1 General

The manufacturer is responsible for organizing the effective implementation of the FPC system in line with the content of this product standard. Tasks and responsibilities in the production control organization shall be documented and this documentation shall be kept up-to-date.

The responsibility, authority and the relationship between personnel that manages, performs or verifies work affecting product constancy , shall be defined. This applies in particular to personnel that need to initiate actions preventing product non-constancies from occurring, actions in case of non-constancies and to identify and register product constancy problems.

Personnel performing work affecting the constancy of performance of the product shall be competent on the basis of appropriate education, training, skills and experience for which records shall be maintained.

In each factory the manufacturer may delegate the action to a person having the necessary authority to:

— identify procedures to demonstrate constancy of performance of the product at appropriate stages;

— identify and record any instance of non-constancy;

— identify procedures to correct instances of non-constancy.

The manufacturer shall draw up and keep up-to-date documents defining the factory production control. The manufacturer's documentation and procedures should be appropriate to the product and manufacturing process. The FPC system should achieve an appropriate level of confidence in the constancy of performance of the product. This involves :

— the preparation of documented procedures and instructions relating to factory production control operations, in accordance with the requirements of the technical specification to which reference is made;

— the effective implementation of these procedures and instructions;

— the recording of these operations and their results;

— the use of these results to correct any deviations, repair the effects of such deviations, treat any resulting instances of non-conformity and, if necessary, revise the FPC to rectify the cause of non-constancy of performance.

Where subcontracting takes place, the manufacturer shall retain the overall control of the product and ensure that he receives all the information that is necessary to fulfil his responsibilities according to this European Standard.

If the manufacturer has part of the product designed, manufactured, assembled, packed, processed and/or labeled by subcontracting, the FPC of the subcontractor may be taken into account, where appropriate for the product in question.

The manufacturer who subcontracts all of his activities may in no circumstances pass the above responsibilities on to a subcontractor.

NOTE Manufacturers having an FPC system, which complies with EN ISO 9001 and which addresses the provisions of the present European Standard are considered as satisfying the FPC requirements of the Regulation (EU) No 305/2011.

8.3.2.2 Equipment

8.3.2.2.1 Testing

All weighing, measuring and testing equipment shall be calibrated and regularly inspected according to documented procedures, frequencies and criteria.

8.3.2.2.2 Manufacturing

All equipment used in the manufacturing process shall be regularly inspected and maintained to ensure use, wear or failure does not cause inconsistency in the manufacturing process. Inspections and maintenance shall be carried out and recorded in accordance with the manufacturer's written procedures and the records retained for the period defined in the manufacturer's FPC procedures.

8.3.2.3 Raw materials and components

The specifications of all incoming raw materials and components shall be documented, as shall the inspection scheme for ensuring their compliance.

8.3.2.4 Controls during manufacturing process

The manufacturer shall plan and carry out production under controlled conditions.

8.3.2.5 Product testing and evaluation

8.3.2.5.1 General

The manufacturer shall establish procedures to ensure that the stated values of the characteristics he declares are maintained. The characteristics, and the means of control, are given below and the frequencies of testing are given in Annex D.

8.3.2.5.2 Single lintels, combined lintels and composite lintels as defined in 3.1

a) material properties (compressive strength of shell casing units only) (see Clause 4);

b) dimensions, mass and limit deviations (see 5.2);

c) thickness of sheet material;

d) load bearing capacity (see 5.3.1);

e) deflection $\delta_{dv,}$ and δ_{dh} where relevant (see 5.3.1.4);

f) durability (see 5.4);

g) fire resistance (see 5.8);

h) water absorption (see 5.9).

Alternative methods of test to the methods specified in this European Standard may be adopted except for the initial type tests and in case of dispute, provided that these alternative methods satisfy the following:

1) a relationship can be shown to exist between the results from the specified test and those from the alternative test; and

2) the information on which the relationship is based is available.

8.3.2.5.3 Prefabricated part of composite lintels

a) material properties (compressive strength of shell casing units only) (see Clause 4);

b) dimensions, mass and limit deviations (see 5.2);

c) geometry and configuration of the prefabricated part (see 5.3.2);

d) initial shear strength between the prefabricated part of the lintel and the mortar in the bed joint above (see 5.3.2);

e) tensile strength capacity of the prefabricated part of the lintel (see 5.3.2);

f) durability (see 5.4);

g) fire resistance (see 5.8);

h) water absorption (see 5.9).

Alternative methods of test to the methods specified in this European Standard may be adopted except for the initial type tests and in case of dispute, provided that these alternative methods satisfy the following:

1) a relationship can be shown to exist between the results from the specified test and those from the alternative test; and

2) the information on which the relationship is based is available.

8.3.2.6 Non-complying products

The manufacturer shall have written procedures which specify how non-complying products shall be dealt with. Any such events shall be recorded as they occur and these records shall be kept for the period defined in the manufacturer's written procedures.

Where the product fails to satisfy the acceptance criteria, the provisions for non-complying products shall apply, the necessary corrective action(s) shall immediately be taken and the products or batches not complying shall be isolated and properly identified.

Once the fault has been corrected, the test or verification in question shall be repeated.

The results of controls and tests shall be properly recorded. The product description, date of manufacture, test method adopted, test results and acceptance criteria shall be entered in the records under the signature of the person responsible for the control/test.

With regard to any control result not meeting the requirements of this European Standard, the corrective measures taken to rectify the situation (e.g. a further test carried out, modification of manufacturing process, throwing away or putting right of product) shall be indicated in the records.

8.3.2.7 Corrective action

The manufacturer shall have documented procedures that instigate action to eliminate the cause of non-conformities in order to prevent recurrence.

8.3.2.8 Handling, storage and packaging

The manufacturer shall have procedures providing methods of product handling and shall provide suitable storage areas preventing damage or deterioration.

8.3.3 Product specific requirements

The FPC system shall address this European Standard and ensure that the products placed on the market comply with the declaration of performance.

The FPC system shall include a product specific FPC, which identifies procedures to demonstrate compliance of the product at appropriate stages, i.e.:

a) the controls and tests to be carried out prior to and/or during manufacture according to a frequency laid down in the FPC test plan;

and/or

b) the verifications and tests to be carried out on finished products according to a frequency laid down in the FPC test plan.

If the manufacturer uses only finished products, the operations under b) shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

If the manufacturer carries out parts of the production himself, the operations under b) may be reduced and partly replaced by operations under a). Generally, the more parts of the production that are carried out by the manufacturer, the more operations under b) may be replaced by operations under a).

In any case the operation shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

The operations under a) refer to the intermediate states of the product as on manufacturing machines and their adjustment, and measuring equipment etc. These controls and tests and their frequency shall be chosen based on product type and composition, the manufacturing process and its complexity, the sensitivity of product features to variations in manufacturing parameters etc.

The manufacturer shall establish and maintain records that provide evidence that the production has been sampled and tested. These records shall show clearly whether the production has satisfied the defined acceptance criteria and shall be available for at least three years.

8.3.4 Procedure for modifications

If modifications are made to the product, production process or FPC system that could affect any of the product characteristics declared according to this standard, then all the characteristics for which the manufacturer declares performance, which may be affected by the modification, shall be subject to the determination of the product type, as described in 8.2.1.

Where relevant, a re-assessment of the factory and of the FPC system shall be performed for those aspects, which may be affected by the modification.

All assessments and their results shall be documented in a report. 〈A1

Annex A
(informative)

Method for assessment of loads on lintels

Experience has shown that, subject to certain conditions, it is safe to design a lintel to carry less than the sum of the applied loads and the weight of masonry immediately above the lintel. The remainder is dispersed through the masonry on either side of the lintel.

The consequence of this is that the assessment of loading can be made using a load triangle method, the base of the triangle being related to the span of the lintel. A 45° triangle is often used, but different angles have been assumed in different traditional practices.

Such an assessment will be governed by many factors including height of masonry above supports, continuity of masonry beyond the supports and concentrated loads and the nature and disposition of openings above the lintel. The limiting conditions and method to be used should be those adopted by the country in which the product is used.

A combined lintel consisting of a steel member supporting the outer leaf of a wall, and a concrete member supporting the inner leaf, should be designed with the steel member acting as an independent beam spanning the opening or as a cantilever supported on the concrete lintel or as a combination of the two. In either case, the concrete lintel should carry the whole weight of the inner leaf plus any reaction from the steel lintel.

Annex B
(informative)

Recommendations for installation of lintels

B.1 Bearings

The minimum end bearing for lintels should normally be the declared minimum built-in length and not less than 100 mm. The compressive load capacity of the masonry bearing under the lintel support should be verified by calculation with reference to EN 1996-1-1. In the case of cavity walls, the cavity tray should extend not less than 50 mm beyond the cavity return.

The bearing can be reduced to 50 mm when reinforced or pre-stressing bars are extended to 200 mm to be cast into in situ concrete.

B.2 Installation

Prior to installation, the lintel should be examined carefully for any defects or signs of damage and the appropriate action taken according to the manufacturer's recommendation.

Care should be taken to prevent damage to the lintel during installation in line with the manufacturer's recommendation.

The lintel should be bedded on mortar and levelled both along the lintel length and across its width.

For external walls where a damp-proof system is required, this may be a separate damp-proof course, cavity tray or an integral part of the lintel. The damp-proof system should be installed in accordance with the manufacturer's recommendation.

B.3 Composite lintels

Composite lintels should be adequately propped in accordance with the manufacturer's recommendation. The props should not be removed until the masonry element of the lintel has achieved its design strength.

All masonry joints (horizontal and vertical) should be filled with mortar.

The bonding and the masonry work of the composite section should be in accordance with the requirements of the declared characteristics in relation to the overall performance of the composite lintel.

No chases or holes should be formed in the zone of the composite section.

Annex C
(normative)

Corrosion protection systems

C.1 Steel lintels

Steel lintels shall be provided, when relevant, with one of the protective coating systems in accordance with Table C.1. Organic coatings, where used as part of the protective coating system, shall be as given in Table C.2 and the measurement of coating thickness of Type 1 coatings shall be in accordance with EN ISO 1463.

Table C.1 — Materials and corrosion protection systems for steel lintels

Material	Specification for material [a]	Coating specification[f]			Organic coating thickness	Material coating reference[d]
		Mass per side g/m²	Mass per two sides [b] g/m²	Thickness µm	µm	
Austenitic stainless steel (molybdenum chrome nickel alloys)	EN 10088-1, -2, -3, -4, -5	-	-	-	-	L1 [h]
Austenitic stainless steel (chrome nickel alloys)	EN 10088-1, -2, -3, -4, -5	-	-	-	-	L3 [h]
Austenitic ferritic stainless steel	EN 10088-1, -2, -3, -4, -5	-	-	-	-	L4 [h]
Zinc coated steel component	EN ISO 1461 zinc coated steel	710	-	100 [g]	-	L10
Zinc coated steel component	EN ISO 1461 zinc coated steel	460	-	65 [g]	-	L11
Zinc coated steel component with all surfaces in Figure C.1 organic coated	EN ISO 1461 zinc pre-coating, organic coating Type 1	460	-	65 [g]	25	L11.1
Zinc coated steel component with all surfaces in Figure C.1 organic coated	EN ISO 1461 zinc pre-coating, organic coating Type 2	460	-	65 [g]	[e]	L11.2
Zinc coated steel component	EN ISO 1461 zinc coated steel	395	-	55 [g]	-	L11A
Zinc coated steel component with organic coating over all outer surfaces of finished component	EN ISO 1461 zinc pre-coating, organic coating Type 1	395	-	55 [g]	-	L11.1A
Zinc coated steel component with organic coating over all outer surfaces of finished component	EN ISO 1461 zinc pre-coating, organic coating Type 2	395	-	55 [g]	-	L11.2A
Zinc coated steel strip or sheet with organic coating over all outer surfaces of finished component	EN 10346:2009 zinc pre-coating, organic coating Type 1	-	600	42 [c]	25	L12.1
Zinc coated steel strip or sheet with organic coating over all outer surfaces of finished component	EN 10346:2009 zinc pre-coating, organic coating Type 2	-	600	42 [c]	[e]	L12.2
Zinc coated steel strip or sheet with all cut edges organic coated	EN 10346:2009 zinc pre-coating, organic coating Type 1 coating	-	600	42 [c]	25	L14
Zinc coated steel strip or sheet with organic coating	EN 10346:2009 zinc pre-coating, organic coating Type 1	-	275	20 [c]	25	L16.1
Zinc coated steel strip or sheet with organic coating over all outer surfaces of finished component	EN 10346:2009 : zinc pre-coating, organic coating Type 2	-	275	20 [c]	[e]	L16.2

Austenitic-ferritic stainless steel	EN 10088-1, -2, -3, -4, -5	-	-	-	-	L23[h]

[a] Except where specified, an appropriate grade of steel conforming to EN 10020 for zinc-coated products may be chosen.

[b] Coating weight is of zinc and given for two sides for pre-galvanised sheet products. The mean one side figure will be 50 % of the two side figure but not necessarily evenly distributed.

[c] Coating thickness refers to the average thickness of metallic protective coating on any uncut surface of a product or any surface of a post-fabrication galvanised product.

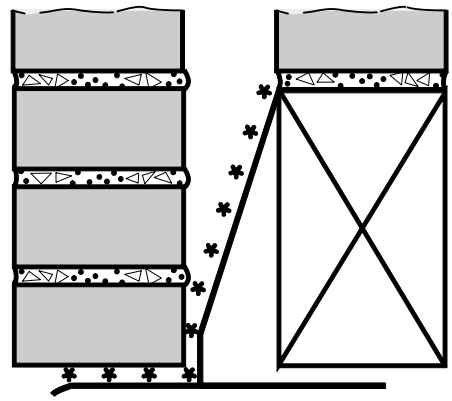
[d] This number is given to allow unambiguous materials specification and gives no indication of relative performance or quality.

[e] Organic coating type 2 is specified by performance testing and not by thickness.

[f] Coating weight and thickness are mean minimum values.

[g] Local minimum thickness.

[h] Treatment of stainless steels after fabrication is necessary in relation to welds etc., in order to maintain corrosion resistance of steel.



*surfaces to have organic coating

Figure C.1 — Surfaces to be organic coated on lintels with material/reference L11.1 and L11.2

Table C.2 — Organic coatings for protective coating systems for steel lintels

Coating	Description
Type 1	a) A bituminous solution of minimum 25 µm dry film thickness; or b) A one pack chemical resistant paint modified to give adequate adhesion to the zinc coated lintel and of minimum dry film thickness of 25 µm.
Type 2	A system which meets the requirements given in 6.2 a) or 6.2 b) and 7.2 a) or 7.2 b) of EN 846-13:2001 for impact, abrasion and corrosion resistance.

C.2 Concrete and masonry lintels (except those manufactured using autoclaved aerated concrete)

Steel reinforcement (except austenitic stainless steel) in concrete lintels and masonry lintels shall be provided with protection against corrosion in accordance with one of the requirements of Table C.3.

For concrete lintels and masonry lintels with austenitic ferritic and austenitic stainless steel reinforcement the material/coating reference shall be declared as 'F'.

Table C.3 — Corrosion protection of steel reinforcement of concrete and masonry lintels with or without structural casing units [a]

Uncoated plain carbon steel with dense aggregate concrete cover [a]				
Material/coating reference [b]	**Concrete lintels [c]**		**Masonry lintels**	
	Minimum cover of concrete in mm for concrete of class [e]		**Minimum cover of concrete [d] in mm for concrete of class [e]**	
	1	2	3	4
	C20/25 and C25/30	C30/37 and above	C20/25 and C25/30	C30/37 and above
A	50	45	50	45
B	40	35	40	35
C	30	25	30	25
D	20	15	20	15
E	15	15	15	15

[a] When the lintel has been designed to be rendered (with a cement or cement-lime render) on the outside face of the lintel then the concrete cover given in the table may be reduced by up to 10 mm.

[b] Code letter in extreme left hand column combined with the appropriate column number, 1 to 4 (e.g. B.4), provides a designation for identification purposes.

[c] For autoclaved aerated concrete, see C.3.

[d] The maximum contribution to the total cover provided by a structural shell casing unit shall be 10 mm. The minimum concrete cover, excluding a shell casing unit, shall be 5 mm.

[e] .Concrete shall conform to EN 206-1 and meet requirements of exposure classes XC3 and XC4.

C.3 Lintels manufactured using autoclaved aerated concrete

No reliance shall be placed on autoclaved aerated concrete cover for the corrosion protection of the reinforcement. For structural purposes, the reinforcement of such lintels shall be provided with a minimum of 10 mm cover.

Lintels made with autoclaved aerated concrete shell casing units and plain carbon steel reinforcement shall be considered as masonry lintels, with non structural casing units, in accordance with Table C.3.

Steel reinforcement (except austenitic stainless steel) in autoclaved aerated concrete lintels shall be provided with protection against corrosion by special coatings that meet the requirements of 5.3.3 of EN 12602:2008 when tested in accordance with EN 990 and the material/coating reference shall be declared as 'G'.

For autoclaved aerated concrete lintels with austenitic ferritic and austenitic stainless steel reinforcement the material/coating reference shall be declared as 'F'.

Annex D
(informative)

Guidance on FPC frequencies

Table D.1 — Checking of finished products

Subject	Purpose of checking	Reference method	Frequency of checking by the manufacturer for a product group
Material properties	Conformity with the declared material/coating specification	In accordance with Table C.1	— for each change of raw material; or — as given in the FPC documentation
Organic coating - Type 2	Conformity with the requirements given in Table C.2 of 〚A1〛 EN 845-2:2013+A1:2016 〚A1〛	EN 846-13	— for each change of raw material; or — as given in the FPC documentation
Dimensions in accordance with 5.2	Conformity with the declared dimensions and the permissible dimensional deviations determined by EN 845-2	EN ISO/IEC 17025 laboratory standards	— 5 product specimens/week of production; or — as given in the FPC documentation
Load bearing capacity (5.3.1.1, 5.3.1.2, 5.3.1.3, 5.3.2)	Conformity with the declared value in accordance with EN 845-2	EN 846-9	— not required if the material properties and dimensions are maintained (see above) unless the product has critical details which cannot be measured in which case 1 product per 5 000 should be tested; or — as given in the FPC documentation
Deflection under load (5.3.1.1 and 5.3.2)	Conformity with the short term declared value in accordance with EN 845-2	EN 846-9	— not required if the material properties and dimensions are maintained (see above) unless the product has critical details which cannot be measured in which case 1 product per 5 000 should be tested; or — at least 1 product specimen/year of product range; or — as given in the FPC documentation
Water absorption (for lintels intended to be used in external elements) (5.9 and 5.10)	Conformity with the declared value in accordance with EN 845-2	EN 846 (all parts)	— 1 product specimen/year of production or for every production batch of the clay units; or — as given in the FPC documentation

Table D.1 — Checking of finished products

Subject	Purpose of checking	Reference method	Frequency of checking by the manufacturer for a product group
Direct airborne sound insulation (in end use condition)/[mass per unit area] for lintels intended to be used in elements subject to acoustic requirements) (5.2.2)	Conformity with the declared value in accordance with EN 845-2	EN 846 (all parts)	— 1 product specimen/year of production; or — as given in the FPC documentation
Thermal resistance (for lintels intended to be used in elements subject to thermal requirements) (4 and 5.6)	Conformity with the declared value in accordance with EN 845-2	EN 846-8	— 3 product specimens/year of production; or — as given in the FPC documentation
The manufacturer does not have to declare a value against every property and some may be on the basis of, for example, a specification referenced in this standard. When the declared value is derived by using standards referenced in EN 845-2, no testing is required. The FPC tests listed in this table should be carried out in accordance with 8.1. Testing of finished product specimens can be replaced by inspections and measurements, when the manufacturer can assure dependence between measurements/inspections and declared load capacity. If the declared load capacity of the product is dependent on the manufacturing process, i.e. quality of welding or tolerances of dimensions, testing can be replaced by an inspection scheme covering welding and measurements of critical dimensions.			

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Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of the EU Construction Products Regulation

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under a mandate M/116, as amended, *"Masonry and related products*" given to CEN by the European Commission and the European Free Trade Association.

When this European Standard is cited in the Official Journal of the European Union (OJEU), under Regulation (EU) No 305/2011, it shall be possible to use it as a basis for the establishment of the Declaration of Performance (DoP) and the CE marking, from the date of the beginning of the co-existence period as specified in the OJEU.

Regulation (EU) No 305/2011, as amended, contains provisions for the DoP and the CE marking.

Table ZA.1 —Relevant clauses for lintels and intended use

Product:	Lintels, as covered in Clause 1 of this standard		
Intended use:	In walls and partitions as covered by the Scope of this standard (to support loads over openings in masonry walls)		
Essential Characteristics	**Clauses of this European Standard related to essential characteristics**	**Classes and/or threshold levels**	**Notes**
Load bearing capacity	5.3.1.1 General 5.3.1.2 Load bearing capacity and load ratio	None	Single and combined lintels: - Load as a mean value and in addition as a characteristic value when required in kN/m and load ratios for lintels intended to support more than a single leaf - Length, width and height in mm or reference to manufacturers component specification - Minimum built in length in mm - Description of component parts of combined lintel which are not supplied as a

Product:	Lintels, as covered in Clause 1 of this standard		
Intended use:	In walls and partitions as covered by the Scope of this standard (to support loads over openings in masonry walls)		
Essential Characteristics	**Clauses of this European Standard related to essential characteristics**	**Classes and/or threshold levels**	**Notes**
			part of the product - Failure mode parameters when relevant Composite lintel when the load bearing capacity is declared: - Load as a mean value and in addition as a characteristic value when required in kN/m - Length, width and height of the prefabricated part in mm or reference to manufacturers component specification - Minimum built in length in mm - Minimum width, height and required minimum strength of the masonry units and the mortar for complementary element in mm and N/mm^2 - Failure mode parameters when relevant Prefabricated part of composite lintel: - Characteristic tensile resistance in kN, F_{tkl} and in serviceability limit state when relevant - Length, width and height of the prefabricated part in mm or reference to manufacturers component specification

Product:	Lintels, as covered in Clause 1 of this standard		
Intended use:	In walls and partitions as covered by the Scope of this standard (to support loads over openings in masonry walls)		
Essential Characteristics	**Clauses of this European Standard related to essential characteristics**	**Classes and/or threshold levels**	**Notes**
			- Minimum built in length in mm - Geometry and configuration of the prefabricated part including the position, diameter and yield strength of the reinforcement or reference to manufacturers component specification - Characteristic initial shear strength f_{vk0} between prefabricated part of the lintel and the mortar above in N/mm^2 stating if the declared value is a fixed or tested value.
Deflection under load	5.3.1.1 General and 5.3.1.4 Short term deflection	None	Deflection in mm [a]
Water absorption (for lintels intended to be used in external elements)	5.9 Water absorption	None	As given in the relevant part of EN 771, according to material type
Water vapour permeability (for lintels intended to be used in external elements)	5.10 Water vapour permeability	None	Diffusion coefficient (dimensionless)
Direct airborne sound insulation (in end use condition)/[Mass per unit area] for lintels intended to be used in elements subject to acoustic requirements)	4 Materials 5.2.2 Mass per unit area	None	Mass per unit area in kg/m^2
Thermal resistance (for lintels intended to be used in elements subject to thermal requirements)	4 Materials 5.6 Thermal properties	None	Thermal conductivity in W/(m·K) [b]
Resistance to fire	5.8 Resistance to fire	Class(es) according to EN 13501-2	Class(es) with a full description of the tested system(s)

Product:	Lintels, as covered in Clause 1 of this standard		
Intended use:	In walls and partitions as covered by the Scope of this standard (to support loads over openings in masonry walls)		
Essential Characteristics	**Clauses of this European Standard related to essential characteristics**	**Classes and/or threshold levels**	**Notes**
		relevant to the intended use(s)	
Durability of performance characteristics (against corrosion)	5.4 Durability	None	Material/coating reference and steel grade/ concrete strength class relevant to lintel type. [c]
Durability of performance characteristics (against freeze/thaw) (for lintels intended to be used in external elements only)	4 Materials and 5.7 Freeze/thaw resistance	None	Freeze/thaw resistant or not freeze/thaw resistant
Dangerous substances	5.11	None	
[a] Not relevant for the prefabricated part of composite lintels.			
[b] Where relevant values are calculated using EN 1745 or the thermal conductivity of the materials.			
[c] Durability of performance characteristics against corrosion is dependent on both the condition of exposure of the masonry and the material/coating specification.			

ZA.2 System of Assessment and Verification of Constancy of Performance (AVCP)

The AVCP system(s) of lintels indicated in Table ZA.1 can be found in the EC legal act(s) adopted by the EC: Directive 89/106/EEC (CPD) Annex III.2.(ii), Second possibility.

Micro-enterprises are allowed to treat products under AVCP system 3 covered by this standard in accordance with AVCP system 4, applying this simplified procedure with its conditions, as foreseen in Article 37 of Regulation (EU) No.305/2011.

ZA.3 Assignment of AVCP tasks

The AVCP of lintels as provided in Table ZA.1 is defined in Table(s) ZA.2 resulting from application of the clauses of this or other European Standards indicated therein. The content of the tasks assigned to the notified body shall be limited to those essential characteristics, if any, as provided for in Annex III of the relevant standardization request and to those that the manufacturer intends to declare.

Taking into account the AVCP systems defined for the products and the intended uses the following tasks are to be undertaken by the manufacturer and the notified body respectively for the assessment and verification of the constancy of performance of the product.

Table ZA.2 — Assignment of AVCP tasks for lintels

Tasks		Content of the task	Evaluation of conformity clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to all characteristics of Table ZA.1	8.3 and Annex D
Tasks for a notified body	The notified laboratory shall assess the performance on the basis of testing (based on sampling carried out by the manufacturer), calculation, tabulated values or descriptive documentation of the construction product.	Load bearing capacity (see 5.3.1.1, 5.3.1.2 and 5.3.2) Deflection $\delta_{dv,}$ and δ_{dh} when relevant (see 5.3.1.4) Resistance to fire (see 5.8) Durability (see 4.3 for shell casing units and 5.4 for organic coatings)	8.2

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Bibliography

[1] CEN/TS 772-22, *Methods of test for masonry units — Part 22: Determination of freeze/thaw resistance of clay masonry units*

[2] EN 846-2, *Methods of test for ancillary components for masonry — Part 2: Determination of bond strength of prefabricated bed joint reinforcement in mortar joints*

[3] EN 846-3, *Methods of test for ancillary components for masonry — Part 3: Determination of shear load capacity of welds in prefabricated bed joint reinforcement*

[4] EN 846-4, *Methods of test for ancillary components for masonry — Part 4: Determination of load capacity and load-deflection characteristics of straps*

[5] EN 846-5, *Methods of test for ancillary components for masonry — Part 5: Determination of tensile and compressive load capacity and load displacement characteristics of wall ties (couplet test)*

[6] EN 846-6, *Methods of test for ancillary components for masonry — Part 6: Determination of tensile and compressive load capacity and load displacement characteristics of wall ties (single end test)*

[7] EN 846-7, *Methods of test for ancillary components for masonry — Part 7: Determination of shear load capacity and load displacement characteristics of shear ties and slip ties (couplet test for mortar joint connections)*

[8] EN 846-8, *Methods of test for ancillary components for masonry — Part 8: Determination of load capacity and load-deflection characteristics of joist hangers*

[9] EN 846-10, *Methods of test for ancillary components for masonry — Part 10: Determination of load capacity and load deflection characteristics of brackets*

[10] EN 1090-1, *Execution of steel structures and aluminium structures — Part 1: Requirements for conformity assessment of structural components*

[11] EN 1992-1-1:2004, *Eurocode 2: Design of concrete structures — Part 1-1: General rules and rules for buildings*

[12] EN 1996-1-1:2005+A1:2012, *Eurocode 6 — Design of masonry structures — Part 1-1: General rules for reinforced and unreinforced masonry structures*

[13] EN 10111, *Continuously hot rolled low carbon steel sheet and strip for cold forming — Technical delivery conditions*

[14] EN 10130, *Cold rolled low carbon steel flat products for cold forming — Technical delivery conditions*

[15] EN 12620, *Aggregates for concrete*

[16] EN 13225, *Precast concrete products — Linear structural elements*

[17] EN ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025)*

[18] ISO 12491, *Statistical methods for quality control of building materials and components*

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National Annex NA

(informative)

Additional information for the use of EN 845-2 in the UK

NA.1 General

Specifications for lintels that are to be in accordance with EN 845-2, should state the required performance characteristics.

Guidance on the use of lintels is given in, but not limited to, EN 1996-1-1, EN 1996-2, PD 6697, which includes a method of assessing loads on lintels, and BS 8103-2.

NA.2 Scope

EN 845-2 covers lintels up to a maximum clear span of 4,5 m.

EN 845-2 covers concrete lintels (including autoclaved aerated concrete lintels), steel lintels, composite lintels, combined lintels (i.e. two-part lintels) and masonry lintels. EN 845-2 does not cover timber lintels, which can be designed in accordance with EN 1995-1-1.

NA.3 Dimensions and limit deviations (see BS EN 845-2, 5.2)

The dimensions of a lintel and the built-in length are to be declared by the manufacturer. The effective span, L_E, is defined but it is not required to be declared. The maximum effective span can be calculated as the overall lintel length less half of the summation of the built-in lengths at each end of the lintel.

NA.4 Mechanical performance (see BS EN 845-2, 5.3)

EN 845-2 requires mechanical performance to be declared in terms of the total uniformly distributed loading that can be carried at ultimate failure based on tests for flexural and shear resistance, and additionally on a serviceability deflection limitation, for a lintel spanning L_E. A mean value of load capacity has to be declared, but a characteristic value may also be declared, as 0.9 times the mean value. Conventionally in UK practice, safe load tables have been used for lintel design and these can be derived by dividing the declared mean value of lintel load-bearing capacity by the global safety factor ($\gamma_m \times \gamma_f$), as given in Table NA.1, where γ_m is the material partial factor and γ_f is the partial factor for loads.

Table NA.1 — Values of $\gamma_m \times \gamma_f$ for use in preparation of safe load tables

Lintel type	$\gamma_m \times \gamma_f$
Concrete and masonry	2,25
Steel	1,6

EN 845-2 requires a manufacturer to declare a short term vertical deflection at one third of the declared load bearing capacity. For serviceability, and in the derivation of safe load tables for use in the UK, the numerical value of flexural deflection is limited to 1/325 of the effective span or to a lesser deflection, where required. Consequently, the declared value of flexural load should be reduced by linear interpolation to give a corresponding value of load capacity.

NA.5 Durability (see BS EN 845-2, 5.4)

EN 845-2:2003, Annex C requires a material/coating reference to be declared from a list of materials and corrosion protection systems.

Guidance on the choice from Annex C of EN 845-2, of materials and corrosion protection systems suitable for use in the UK will be found in PD 6697. Other user design and execution guidance can also be found in EN 1996-2.

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